

# DATA SHEET

## **PEMH7; PUMH7**

**NPN/NPN resistor-equipped  
transistors; R1 = 4.7 k $\Omega$ , R2 = open**

Product data sheet  
Supersedes data of 2001 Oct 22

2003 Oct 02

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R1 = 4.7 kΩ, R2 = open**

**PEMH7; PUMH7**

**FEATURES**

- Built-in bias resistors
- Simplified circuit design
- Reduction of component count
- Reduced pick and place costs.

**APPLICATIONS**

- Low current peripheral driver
- Replacement of general purpose transistors in digital applications
- Control of IC inputs.

**QUICK REFERENCE DATA**

| SYMBOL           | PARAMETER                 | TYP. | MAX. | UNIT |
|------------------|---------------------------|------|------|------|
| V <sub>CEO</sub> | collector-emitter voltage | –    | 50   | V    |
| I <sub>O</sub>   | output current (DC)       | –    | 100  | mA   |
| TR1              | NPN                       | –    | –    | –    |
| TR2              | NPN                       | –    | –    | –    |
| R1               | bias resistor             | 4.7  | –    | kΩ   |
| R2               | bias resistor             | open | –    | –    |

**DESCRIPTION**

NPN/NPN resistor-equipped transistors (see “Simplified outline, symbol and pinning” for package details).

**PRODUCT OVERVIEW**

| TYPE NUMBER | PACKAGE |       | MARKING CODE <sup>(1)</sup> | NPN/PNP COMPLEMENT | PNP/PNP COMPLEMENT |
|-------------|---------|-------|-----------------------------|--------------------|--------------------|
|             | PHILIPS | EIAJ  |                             |                    |                    |
| PEMH7       | SOT666  | –     | H3                          | PEMD6              | PEMB3              |
| PUMH7       | SOT363  | SC-88 | H*7                         | PUMD6              | PUMB3              |

**Note**

- \* = p: Made in Hong Kong.  
\* = t: Made in Malaysia.

**SIMPLIFIED OUTLINE, SYMBOL AND PINNING**

| TYPE NUMBER    | SIMPLIFIED OUTLINE AND SYMBOL                                   | PINNING |               |
|----------------|---|---------|---------------|
|                |   | PIN     | DESCRIPTION   |
| PEMH7<br>PUMH7 | <p>Top view <span style="margin-left: 100px;">MAM453</span></p> | 1       | emitter TR1   |
|                |   | 2       | base TR1      |
|                |   | 3       | collector TR2 |
|                |   | 4       | emitter TR2   |
|                |   | 5       | base TR2      |
|                |   | 6       | collector TR1 |

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## ORDERING INFORMATION

| TYPE NUMBER | PACKAGE |  |         |
|-------------|---------|--|---------|
|             | NAME    | DESCRIPTION                              | VERSION |
| PEMH7       | –       | Plastic surface mounted package; 6 leads | SOT666  |
| PUMH7       | –       | Plastic surface mounted package; 6 leads | SOT363  |

## LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 60134).

| SYMBOL                | PARAMETER                     | CONDITIONS               | MIN. | MAX. | UNIT |
|-----------------------|-------------------------------|--------------------------|------|------|------|
| <b>Per transistor</b> |                               |                          |      |      |      |
| V <sub>CBO</sub>      | collector-base voltage        | open emitter             | –    | 50   | V    |
| V <sub>CEO</sub>      | collector-emitter voltage     | open base                | –    | 50   | V    |
| V <sub>EBO</sub>      | emitter-base voltage          | open collector           | –    | 5    | V    |
| I <sub>O</sub>        | output current (DC)           |                          | –    | 100  | mA   |
| I <sub>CM</sub>       | peak collector current        |                          | –    | 100  | mA   |
| P <sub>tot</sub>      | total power dissipation       | T <sub>amb</sub> ≤ 25 °C |      |      |      |
|                       | SOT363                        | note 1                   | –    | 200  | mW   |
|                       | SOT666                        | notes 1 and 2            | –    | 200  | mW   |
| T <sub>stg</sub>      | storage temperature           |                          | –65  | +150 | °C   |
| T <sub>j</sub>        | junction temperature          |                          | –    | 150  | °C   |
| T <sub>amb</sub>      | operating ambient temperature |                          | –65  | +150 | °C   |
| <b>Per device</b>     |                               |                          |      |      |      |
| P <sub>tot</sub>      | total power dissipation       | T <sub>amb</sub> ≤ 25 °C |      |      |      |
|                       | SOT363                        | note 1                   | –    | 300  | mW   |
|                       | SOT666                        | notes 1 and 2            | –    | 300  | mW   |

## Notes

1. Device mounted on an FR4 printed-circuit board, single-sided copper, standard footprint.
2. Reflow soldering is the only recommended soldering method.

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### THERMAL CHARACTERISTICS

| SYMBOL                | PARAMETER                                   | CONDITIONS               | VALUE | UNIT |
|-----------------------|---|--------------------------|-------|------|
| <b>Per transistor</b> |   |                          |       |      |
| R <sub>th j-a</sub>   | thermal resistance from junction to ambient | T <sub>amb</sub> ≤ 25 °C |       |      |
|                       | SOT363                                      | note 1                   | 625   | K/W  |
|                       | SOT666                                      | notes 1 and 2            | 625   | K/W  |
| <b>Per device</b>     |   |                          |       |      |
| R <sub>th j-a</sub>   | thermal resistance from junction to ambient | T <sub>amb</sub> ≤ 25 °C |       |      |
|                       | SOT363                                      | note 1                   | 416   | K/W  |
|                       | SOT666                                      | notes 1 and 2            | 416   | K/W  |

### Notes

1. Device mounted on an FR4 printed-circuit board, single-sided copper, standard footprint.
2. Reflow soldering is the only recommended soldering method.

### CHARACTERISTICS

T<sub>amb</sub> = 25 °C unless otherwise specified.

| SYMBOL                | PARAMETER                            | CONDITIONS   | MIN. | TYP. | MAX. | UNIT       |
|-----------------------|--------------------------------------|--|------|------|------|------------|
| <b>Per transistor</b> |                                      |  |      |      |      |            |
| I <sub>CBO</sub>      | collector-base cut-off current       | V <sub>CB</sub> = 50 V; I <sub>E</sub> = 0                             | –    | –    | 100  | nA         |
| I <sub>CEO</sub>      | collector-emitter cut-off current    | V <sub>CE</sub> = 30 V; I <sub>B</sub> = 0                             | –    | –    | 1    | $\mu$ A    |
|                       |                                      | V <sub>CE</sub> = 30 V; I <sub>B</sub> = 0; T <sub>j</sub> = 150 °C    | –    | –    | 50   | $\mu$ A    |
| I <sub>EBO</sub>      | emitter-base cut-off current         | V <sub>EB</sub> = 5 V; I <sub>C</sub> = 0                              | –    | –    | 100  | nA         |
| h <sub>FE</sub>       | DC current gain                      | V <sub>CE</sub> = 5 V; I <sub>C</sub> = 1 mA                           | 200  | 330  | –    |            |
| V <sub>CEsat</sub>    | collector-emitter saturation voltage | I <sub>C</sub> = 5 mA; I <sub>B</sub> = 0.25 mA                        | –    | –    | 100  | mV         |
| R1                    | input resistor                       |  | 3.3  | 4.7  | 6.1  | k $\Omega$ |
| C <sub>c</sub>        | collector capacitance                | V <sub>CB</sub> = 10 V; I <sub>E</sub> = i <sub>e</sub> = 0; f = 1 MHz | –    | –    | 2.5  | pF         |

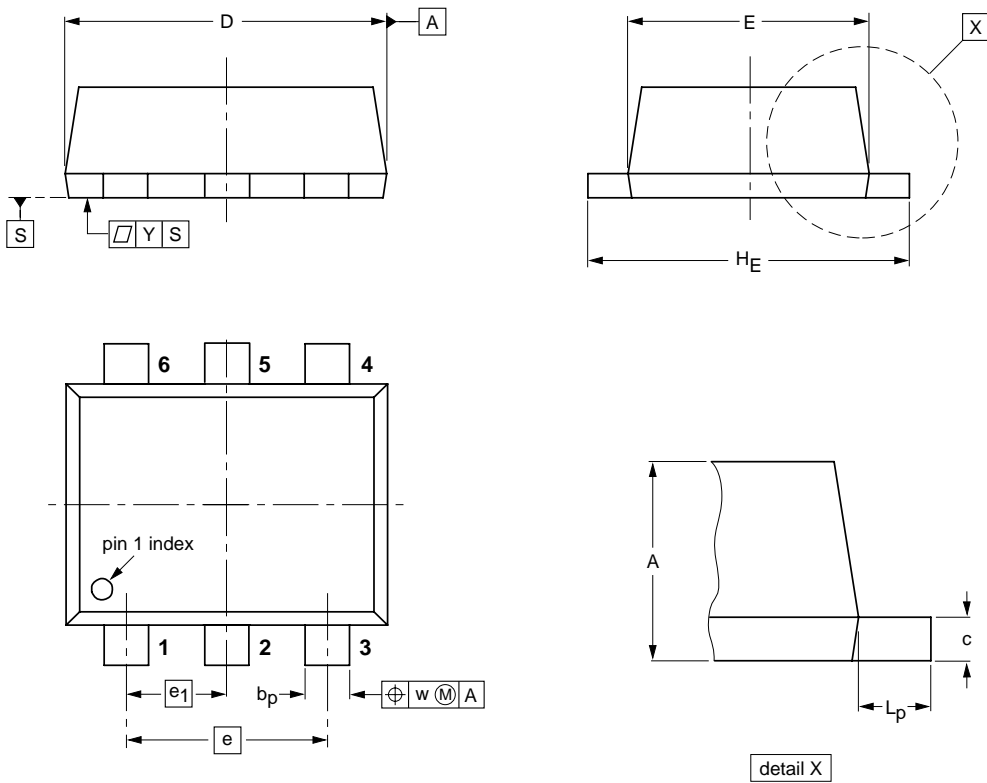
NPN/NPN resistor-equipped transistors;  
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PACKAGE OUTLINE

Plastic surface mounted package; 6 leads

SOT666



DIMENSIONS (mm are the original dimensions)

| UNIT | A          | $b_p$        | c            | D          | E          | e   | $e_1$ | $H_E$      | $L_p$      | w   | y   |
|------|------------|--------------|--------------|------------|------------|-----|-------|------------|------------|-----|-----|
| mm   | 0.6<br>0.5 | 0.27<br>0.17 | 0.18<br>0.08 | 1.7<br>1.5 | 1.3<br>1.1 | 1.0 | 0.5   | 1.7<br>1.5 | 0.3<br>0.1 | 0.1 | 0.1 |

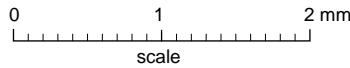
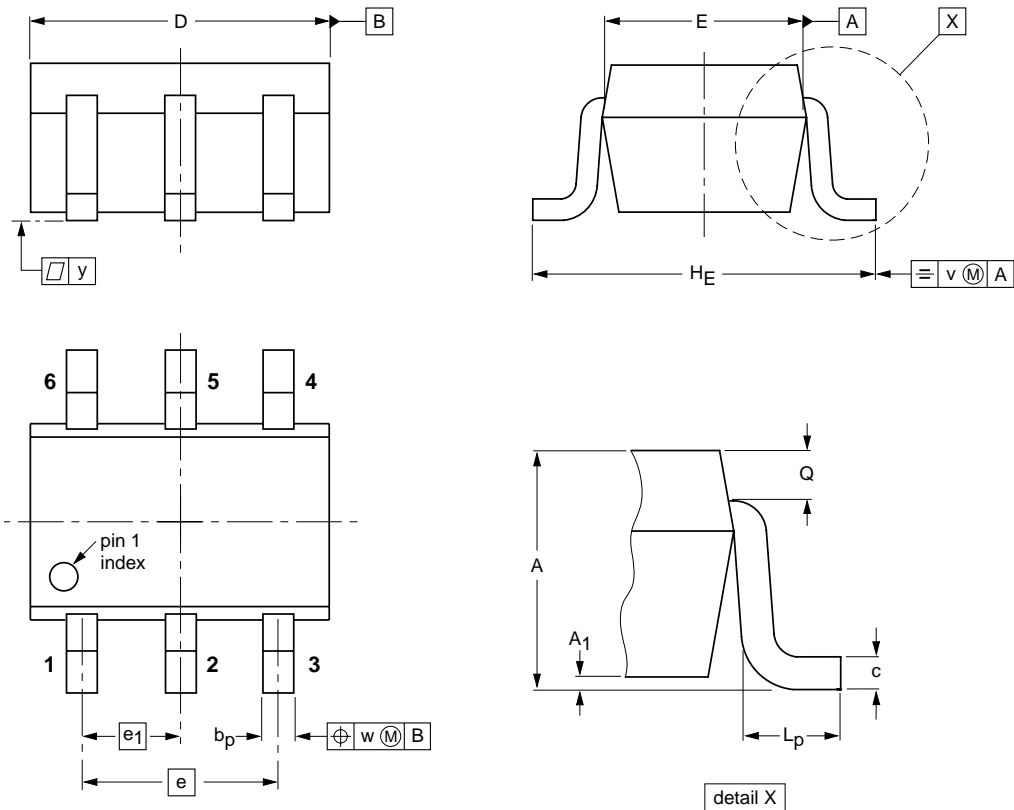
| OUTLINE VERSION | REFERENCES |       |      |  | EUROPEAN PROJECTION | ISSUE DATE           |
|-----------------|------------|-------|------|--|---------------------|----------------------|
|                 | IEC        | JEDEC | EIAJ |  |                     |                      |
| SOT666          |            |       |      |  |                     | 01-01-04<br>01-08-27 |

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SOT363



DIMENSIONS (mm are the original dimensions)

| UNIT | A          | A <sub>1</sub><br>max | bp           | c            | D          | E            | e   | e <sub>1</sub> | H <sub>E</sub> | L <sub>p</sub> | Q            | v   | w   | y   |
|------|------------|-----------------------|--------------|--------------|------------|--------------|-----|----------------|----------------|----------------|--------------|-----|-----|-----|
| mm   | 1.1<br>0.8 | 0.1                   | 0.30<br>0.20 | 0.25<br>0.10 | 2.2<br>1.8 | 1.35<br>1.15 | 1.3 | 0.65           | 2.2<br>2.0     | 0.45<br>0.15   | 0.25<br>0.15 | 0.2 | 0.2 | 0.1 |

| OUTLINE<br>VERSION | REFERENCES |       |       | EUROPEAN<br>PROJECTION | ISSUE DATE |
|--------------------|------------|-------|-------|------------------------|------------|
|                    | IEC        | JEDEC | EIAJ  |                        |            |
| SOT363             |            |       | SC-88 |                        | 97-02-28   |

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## DATA SHEET STATUS

| DOCUMENT STATUS <sup>(1)</sup> | PRODUCT STATUS <sup>(2)</sup> | DEFINITION  |
|--------------------------------|-------------------------------|---|
| Objective data sheet           | Development                   | This document contains data from the objective specification for product development. |
| Preliminary data sheet         | Qualification                 | This document contains data from the preliminary specification.                       |
| Product data sheet             | Production                    | This document contains the product specification.                                     |

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